AUSTRALIAN *SYLLIDAE*, *EUSYLLIDAE* AND *AUTOLYTIDAE*.

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(With Plates x.-xiii.)

INTRODUCTION.

This paper deals with the families *Syllidae*, *Eusyllidae* and *Autolytidae* of the section *Syllidea* (*Polychaeta Phanerocephala*), and is to some extent a continuation of one on the *Exogonea* recently* published. Unlike the latter, however, it is entirely systematic and descriptive, structural and developmental points being reserved for separate treatment. The material consists almost exclusively of specimens collected by the author about low-water mark in Port Jackson and examined in the living condition in the first instance. The types of the species described as new have been deposited in the Australian Museum.

In 1885 I published descriptions of six members of the family *Syllidae* found in Port Jackson. The original specimens have been lost, but the identity of five of the six species is definitely determined as a result of Augener's study of the Polychaeta collected by the Hamburg Expedition to South-western Australia (1), together with the present contribution. There remains in doubt *Gnathosyllis zonata* mihi. This was founded on a solitary specimen obtained with the dredge. There are indications that Augener's identification with this of a *Typosyllis* in his collection is incorrect.

The general classification here followed is that of Malaquin, and, within the extensive genus *Syllis*, the division into sub-genera proposed by Langerhans and followed by various recent writers (De Saint-Joseph, Gravier, Augener) has been adopted.

I have found some difficulty in dealing with the genus *Pionosyllis*. Malmgren's original diagnosis (41, p. 39) comprises the following points—a single pharyngeal tooth; compound setae with long slender bidentate appendages; capillary setae on the middle and posterior segments; other characters as in *Syllis*. The type species, *P. compacta*, has "palpi distantes," "tentacula indistincte articulata" and "cirri dorsuales vix articulati."

In the classification of the *Syllidea* elaborated by Langerhans (36), *Pionosyllis* is characterised as having the palpi not fused, the tentacles and dorsal cirri not articulated, and as having the pharynx armed with a single tooth which is situated anteriorly.

In Malaquin's scheme (40), *Pionosyllis* is grouped among the *Eusyllidae*—*Syllidea* possessing ventral cirri, having the palpi fused at the base only, the tentacles and dorsal cirri indistinctly articulated, and reproducing only directly without schizogamy. From the other genera of that family it is distinguished by the single, anterior pharyngeal tooth.

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The following suggested diagnosis of *Pionosyllis* assumes that the type species, *P. compacta*, has the palpi united at the base.

Syllidea with ventral cirri, the palpi united at the bases only, the tentacles and cirri devoid of segmentation or incompletely segmented, the compound setae bidentate. The pharynx with a single tooth situated anteriorly; no schizogamy.

This would exclude species such as *Syllis erilis* Gravier, *S. macroceras* Grube, *S. hyalina* Grube, *S. moniliformis* Savigny, and a number of others, which approach *Pionosyllis* in having the palpi fused at the base, or the tentacles imperfectly segmented or in the union of both of these characters, if reproduction is accompanied by schizogamy.

Family SYLLIDAE.

Genus Syllis Savigny.

Sub-genus Typosyllis Langerhans.

Syllis (Typosyllis) variegata Grube. (Plate x., figs. 1 and 2).

Syllis variegata, Grube, (19), p. 85, Taf. 3, fig. 6.
Syllis hexagonifera, Claparede, (5), p. 73, Pl. 5, fig. 2.
? *Thoe fusiformis*, Kinberg, (31), p. 249.
? *Thoe fusiformis*, Kinberg, (32), p. 61, Tab. 51, fig. 4-8.
Syllis nigropunctata, Haswell, (25), p. 12, Pl. 52, figs. 1-3.
Syllis compacta, Gravier, (16), p. 165, Pl. 9, fig. 11.
Syllis (*Typosyllis*) *variegata*, Gravier, (16), p. 158, figs. 24 to 27, Pl. 9, fig. 8.
Syllis (*Typosyllis*) *variegata*, De St. Joseph, (48), p. 22 (146).
Syllis variegata, Marenzeller, (42), 2 Beitrag, p. 19, Pl. 2, fig. 2.
Syllis variegata, Langerhans, (36), p. 532.
Syllis variegata, Marion et Bobretzky, (45), p. 22.
Syllis (*Typosyllis*) *variegata*, Augener, (1), p. 190.
Syllis closterobranchia var., Ehlers, (10), 1, p. 20, Taf. 3, fig. 1-4.

Syllis (*Typosyllis*) *variegata* is the commonest species of *Syllis* in Port Jackson, and in some situations, as among the roots of oar-weeds (*Eklonia*), it is extremely abundant, by far the most numerous of the larger Polychaeta. It also occurs in Port Stephens. It grows to a large size, being often two or even three cm. in length in the living, fully-extended condition; but contracts to about half its length when fixed by any of the ordinary methods.*

Such large specimens, and the majority of the smaller ones, are readily recognisable owing to the very characteristic pattern of the pigment on the dorsal surface. The main feature of this pattern which was figured broadly by Marenzeller (42), is the arrangement of black or brown pigment on the dorsal surface of each segment, in such a way as to leave two, somewhat irregular, transversely elongated, colourless spaces (spectacle pattern). This pigment pattern is most pronounced in front, the pigment fading away towards the posterior end. An almost invariable feature, so far as the Sydney specimens are concerned, is the alternation of darker and lighter segments, the latter always being the segments bearing the larger, dorsally directed pairs of cirri, the more ventrally directed shorter pairs which alternate with them being borne on the darker segments.†

* By pouring over well-extended live specimens, water warmed to 70°C. immediate paralysis is produced and fixation can be effected with little contraction.

† This arrangement is most probably connected with the exceptional sensitiveness to bright light shown by this species.

Comparatively rare are specimens in which, though the dorsal surface is darkly pigmented, it wants the characteristic pattern described above, the pigment being disposed in transverse bands, two on each segment; here too there is an alternation of darker and lighter segments with the alternation of the shorter and longer cirri.

Many of the smaller specimens however, are devoid of the dark pigment. Many of these have a light red colour due to the presence of diffused particles of red pigment, some are greenish, others orange or yellow.

Apart from markings and colouration, the following points seem to be distinctive of *S. variegata*:—

Palpi in the living animal elongated, longer than the prostomium, their inner edges in contact at the base for about a fourth of their length, narrowing distally with rounded ends, with a deep hollow on the inner part of the ventral surface. Tentacles and cirri elongated, with numerous well-defined segments filled with twisted unicellular (vermiculate) glands. Dorsal cirri alternately longer and shorter, with from twenty to thirty-five segments. The anal cirri are similar to the dorsal; between them is a median narrow process.

As in other species of *Syllis*, the parapodium, when viewed from above or below, though not deeply cleft, appears divided into two lobes at the end. In anterior or posterior view these lobes are found to represent broad vertical flaps, anterior and posterior. Close to the latter on its dorsal side are the points of the acicula; between the flaps or lobes is the irregular surface through which the setae protrude.

The compound setae (Plate x., fig. 1) 8 to 12 in number in each parapodium, are of uniform character throughout; they all have the appendage (*falx*) straight, bidentate terminally, and with a strong fringe of some 20 pieces along the cutting edge of the blade.

The length of the falx is greater in the setae of the anterior region of the body than in those of the segments behind, but the difference is not great, and the transition from one form to the other is very gradual.

As pointed out by Augener, each parapodium in the extreme posterior region has, as in most species of *Syllis*, a simple seta in addition to the compound. This, which is always dorsal to all the latter, is in *S. variegata* of the gently curved, terminally bidentate type which is the commonest form of these simple setae in the majority of the species of *Syllis* which I have seen. The acicula (Plate x., fig. 2) are fairly characteristic. Usually there are three in each parapodium; but sometimes there are four or five. When three are present one—the most anterior and ventral—is almost always very slightly bent at the end, and slightly knobbed; the other two, which are very stout, are straight to the end and obtusely or acutely pointed.

The position of the parts of the proboscis in the usual retracted state is usually regarded as important in the diagnosis of the species of *Syllis*: it is fairly constant in the individuals of a species, but is subject to some modification owing to the occasional occurrence of states of incomplete retraction. More important is the *length* of the pharynx and proventriculus in terms of the number of segments through which each runs. Within a limited range of variation this appears to be constant for each species—except in the comparatively rare instances of regeneration.

In *S. variegata* both pharynx and proventriculus are comparatively long, each running through eight, twelve or fourteen segments.

SYLLIS (TYPOSYLLIS) PECTINANS, n.sp. (Plate x., fig. 3-6).

When alive and fully extended this is a slender, almost thread-like worm, measuring, in the case of the larger specimens, about 1.5 to 2 cm. in length. The colour varies considerably, the differences being due mainly to differences in the colour of the intestine as described below. The body-wall may be transparent and colourless, but usually there are widely-diffused minute particles of reddish-brown pigment, most abundant in the dorsal integument in the anterior region, where, in some cases, they tend here and there to become arranged in very irregular transverse lines stronger towards the anterior and posterior limits of the segment. The pigment may be scattered also through the tentacles, palpi and cirri, but sometimes these appendages are completely colourless.

The tentacles and cirri contain numerous sausage-shaped glands which are usually extremely bright and conspicuous in the living animal. Sensory cilia are abundant on the tentacles, palpi and dorsal cirri, less abundant on the ventral cirri. Vibratile cilia run along the sides of the segments between the parapodia.

The prostomium is broader than long, elliptical in general outline. The pigment which it usually bears dorsally, is irregularly distributed. The eyes are always comparatively small, and a frontal pair is rarely present. The palpi are entirely separate, though in close contact in their basal portions. The median tentacle is the longest—about five times the length of the prostomium, with about 35 well-defined joints; the lateral about thrice the length of the prostomium, with about 25 joints.

The peristomium appears on the dorsal surface for a narrow space only. The dorsal peristomial tentacles are about equal in length to the median, and have about the same number of joints; the ventral are a little shorter.

There are about 60-70 segments in the body before stolonisation begins.

The parapodia (Plate x., fig. 4) are not very prominent, less than half the breadth of the body, slightly bilobed, the anterior lobe much the more prominent. Each contains about 10 or 12 compound setae (Plate x., fig. 5) which vary little in character throughout. Their falces are all relatively short, unidentate, with a fringe of unusually strong, pointed processes along the cutting edge, those towards the apex becoming very rudimentary. There is a simple seta (Plate x., fig. 6) on the dorsal side of the compound in all the posterior parapodia: in a specimen of 67 segments without definite stolonisation these begin on the 26th segment, and are continued to the posterior end; in a female specimen of about 60 segments with a stolon, they begin four segments in front of the stolon (on the 40th segment); in another similar specimen they begin nine segments in front of the stolon. They are similar to the simple setae of *S. variegata*—gently curved towards the free end, pointed, obscurely bidentate, and with four or five cilia on the concave edge of the terminal curved region. In three or four of the last segments a simple bidentate seta occurs on the ventral side of the bundle of compound setae: this is finer and shorter than the dorsal simple seta, and does not seem to be always present.

In specimens with mature stolons, bundles of capillary setae occur on all the segments of the stolon; when fully developed these are twice or thrice the length of the compound setae.

There are four acicula (Plate x., fig. 4) in each of the most anterior parapodia, three or two in the rest; all are knobbed at the ends with the knob usually sharply bent, but towards the dorsal side, so that the bend is not readily perceptible.

Of the dorsal cirri there is an alternation of longer and shorter, the longer in the anterior region more than twice as long as the breadth of the body, and composed of about forty segments. The ventral cirri are short, not extending as far as the ends of the parapodia. The anal cirri are similar to the larger dorsal; between them is a well-developed, narrow median process.

The pharynx, which is brownish or reddish, extends as far as the 9th segment. An important feature is that the tooth is situated some little distance behind the anterior margin of the pharynx (Plate x., fig. 3). The proventriculus is rather variable, lying in the 10th to 14th or 15th or 9th to 14th or 10th to 18th segments—five to eight segments. Brown pigment runs in the raphes and the annular bands of non-striated muscles, of which there are about 35. The ventriculus, light brown or red in colour, has the usual T-shaped caeca, the anterior branch the larger. The intestine is deeply constricted, usually of a dark green colour, or yellow or orange mixed with green, or orange throughout.

In ripe females, the ovaries, purple in colour, are developed from about the 30th to the 40th segments, backwards—the stolon, of about 20 to 25 segments, beginning about the 40th or 50th. In the male, the ripe stolon is of a bright red, pink or scarlet colour, and consists of about 20 segments with dilated nephridia packed with sperms in rounded groups.

T. pectinans occurs very abundantly between tide-marks in Port Jackson, and is particularly numerous among the tubes of the common Serpulid, *Galeolaria hystrix*.

Relying on Langerhans's account (36, p. 530, Taf. 31, fig. 3) of the species which he identified with *S. prolifera* Krohn, I was at first inclined to regard the form above described as referable to that species. One of the chief reasons for this view was the exceptional position in both of the pharyngeal tooth. A careful comparison showed, however, that such a determination could not be maintained. Langerhans refers to the compound setae in *S. prolifera* as "bidentate" without any qualification. Moreover, *S. armandi*, which Langerhans regards as identical, is described by Claparede (5, p. 70) as having setae with bidentate appendages; and the same holds good of *S. lussinensis* Grube (20, p. 46), also regarded by Langerhans as synonymous with the same species.* McIntosh's figures (39) of the compound setae in *S.* (*Pionosyllis*) *prolifera* also all represent them as strongly bidentate. On the whole the evidence seems to be in favour of the conclusion that the Australian species is a hitherto undescribed species of *Typosyllis*, characterised by the combination of two unusual characters—the backward position of the tooth and the presence of unidentate compound setae.

Syllis (Typosyllis) truncata, n.sp. (Plate x., figs. 7-14.)

This, like *T. pectinans*, is a slender elongated *Syllis*, which, when alive and fully extended, becomes a narrow thread. There are over a hundred segments (110-120) in a full-grown specimen. The general colour is reddish without definite markings, darkened behind by the intestine. The length is from 1 to 2 cm. The tentacles and dorsal cirri are full of twisted (vermiculate) unicellular glands similar to those of *S. variegata*.

* Langerhans regards *S. fiumensis* of Ehlers as also identical with *S. prolifera*; if that view be well-founded, Ehlers's figure (6, Taf. ix., fig. 4) of a compound seta must be incorrect.

The prostomium is nearly twice as broad as long, with four very small eyes. The median tentacle is about thrice the length of the prostomium, with about 25 joints; the lateral a little shorter, with about 17 joints. The palpi are ovate, very little narrower at the apex, with the inner edges, in close contact with one another at the base but not fused, diverging very slightly distally.

The dorsal peristomial tentacle is nearly as long as the median, with about 18 joints; the ventral a little shorter.

The parapodia are relatively long; nearly half the breadth of the body in length, and in general outline resemble those of *S. pectinans*. Each has about 8-10 compound setae. These (Plate x., figs. 8 and 9) are all of the same type, the only difference between them being a gradual reduction in length of the falx from the dorsal to the ventral side; all are bidentate with a small secondary tooth and a row of fine cilia along the cutting edge. A simple seta (Plate x., fig. 10) lies on the dorsal side of the compound seta in a variable number of the most posterior segments. It differs from the simple setae of *S. variegata* and *S. pectinans* in being truncate. A shorter, simple, pointed seta lies on the ventral side in the last two or three segments. There is sometimes a single aciculum in each parapodium, sometimes two or three: they are sharply bent forwards at the ends. (Plate x., figs. 11-14.)

The dorsal cirri are long and thick, the first being the longest, with about 28 segments. The rest are alternately longer and shorter, the longer (about 25 joints) longer than the breadth of the body, the shorter (about 17 joints) about equal to it. The ventral cirri scarcely reach as far as the ends of the parapodia. The anal cirri have about 16 joints. There is a narrow median process between them as in *S. pectinans*.

The pharynx is red in colour. When the proboscis is fully drawn back it is long and narrow, extending from the fourth segment, in which the tooth is situated, to the thirteenth. The proventriculus is relatively short, extending through only about four to six segments.

Syllis truncata has been found in Port Stephens as well as Port Jackson.

Many specimens of *S. truncata* bear either one or two white spots on the dorsal surface over the proventriculus or its junction with the intestine. When two are present they may occur on the 16th and 17th or on the 17th and 18th segments; when one only occurs it is usually found on the 18th segment. These white bodies lie in the substance of the dorsal body-wall between the epidermis and the muscular layers, and extend across a considerable part of the breadth of the segment. Contained in each are a large number of rounded masses of an average diameter of about .05 mm., each made up of innumerable minute corpuscles of an approximate diameter of 0.002 mm.

That these bodies are encysted *Sporozoa* appears to admit of little doubt. The constancy of their position would appear to be accounted for by the position of the ventriculus and caeca—the walls of the latter being comparatively thin and easily traversed by the trophozoite in its migration outwards from the lumen of the alimentary canal.

In his description of the Polychaeta of the Canaries Langerhans (35) gives an account of a species of *Typosyllis*, which he calls *T. pulvinata*, characterised by the presence of cushion-like elevations of the dorsal surface of the 18th, 19th, and 20th segments. There can be little doubt that in this species the swellings are due to the same cause as in *T. truncata*. *T. pulvinata* is described as having

the setae distinctly unidentate, and thus appears to differ in a definite way from *T. truncata.*

Syllis (Typosyllis) punctulata, n.sp. (Plate xi., figs. 1-16.)

The length of this very well-marked species is about 1 cm. and the breadth .75 mm. There are about 70 segments in all. The prevailing colour of the dorsal surface is dark red, usually lighter behind, with innumerable minute colourless dots marking the position of integumentary glands. The prostomium and peristomium are much lighter than the body, of a bright orange, the prostomium with an irregular pattern of a darker colour concentrated in front in the position in which frontal eyes usually occur. Vibratile cilia occur on the sides of the segments between the parapodia.

The prostomium (Plate xi., fig. 1) is broader than long; the presence of frontal eyes is inconstant: the ordinary eyes are rather small, the posterior nearer together than the anterior. The palpi are divergent from the base, slightly narrowed distally, longer than the prostomium. The median tentacle is more than twice the length of the prostomium, of about 20 to 30 segments; the lateral tentacles are twice the length of the prostomium, of about 12 to 20 segments. Of the peristomial tentacles the dorsal, which is slightly the longer, is of about the same length as the median. All the tentacles are very distinctly segmented, as are also the dorsal and anal cirri.

The parapodia (Plate xi., fig 2) are not deeply divided. There are 10-12 compound setae (figs. 3 and 4), all of one type, with bidentate falces, which are slightly longer in proportion in the more anterior segments. There are two simple setae in all the posterior parapodia. One of these (figs. 5 to 10) is dorsal to the compound setae: it first appears about the twenty-eighth segment and continues to the posterior end; it is obscurely bidentate; the other (fig. 11) which occurs only on the last few segments, is ventral to the compound setae and is very strongly bidentate, its extremity closely corresponding to the end of the appendage of one of the compound setae. The acicula (figs. 12-16), of which there are three or four in each parapodium, vary a little in shape, but one (the most anterior, (figs. 12 and 13) is always strongly bent forwards at the end, and another (fig. 16) symmetrically pointed.

The dorsal cirri are very distinctly articulated. The first are the longest, as long as the median tentacles, with about 25 to 35 segments. The remainder are shorter than the breadth of the segments and contain 18 to 35 segments; there is no regular alternation. The ventral cirri are short, not extending beyond the ends of the parapodia. The anal cirri are of about the same length as the average dorsal. The pharyngeal tooth is not quite anterior. The pharynx extends to the 7th segment; the proventriculus lies in the 8th to the 13th.

One specimen has a buff-coloured female stolon; the ova extend forwards several segments in front of the head of the stolon.

S. punctulata occurs about the bases of Algae growing on rocks about low-water mark in Port Jackson and Botany Bay.

Syllis (Typosyllis) closterobranchia Schmarda.

Syllis closterobranchia, Schmarda, (49), 2 Theil, p. 72.
Syllis closterobranchia, Ehlers (10), I., p. 19, Taf. iii., fig. 1-4.
Syllis (Typosyllis) closterobranchia, Augener, (1), p. 201. Text-fig. 23.
(For some additional synonyms, see Augener.)

Ehlers in 1904 identified specimens of a *Syllis* received from New Zealand with Schmarda's *S. closterobranchia,* the types of which (from S. Africa) he had the opportunity of examining.

Augener found specimens in the collection from S.W. Australia, and gives some additional particulars. The species thus defined is quite common a little below low-water mark in Port Jackson. The largest specimens measure 4 cm. in length and 1.5 mm. in breadth.

A simple, pointed seta, obscurely bidentate, is present on the dorsal side of the compound setae in the last nine or ten parapodia, disappearing at the point where the characteristic thick, "pseudoypsiloid," compound setae begin to make their appearance. A very similar simple seta lies on the ventral side in a few of the terminal segments.

In a male specimen of 147 segments, the segments are filled with sperms from the 120th backwards, but there is no definite indication of a stolon. Another specimen of 95 segments had no sign of gonads.

Syllis (Typosyllis) gracilis Gravier. (Plate x., fig. 15.)

Syllis gracilis, Gravier, (16), p. 150, Pl. 9, figs. 4-6.
(?) *Syllis longissima,* Gravier, *l.c.,* p. 154.
Syllis (*Typosyllis*) *gracilis,* Augener (1), p. 206.
For further synonymy, see Langerhans (36) and McIntosh (39).

This widely-distributed form, found by Augener in the Hamburg collections from South-west Australia, occurs frequently among Algae etc. brought up from below low-water mark in Port Jackson.

Dorsal simple setae, pointed and obscurely bidentate like the corresponding setae in *S. closterobranchia,* occur on a few of the last segments. The acicula (Plate x., fig. 15) are peculiar, each having a slight rounded terminal enlargement from which a peg-like process projects obliquely.

Syllis (Typosyllis) parturiens, n.sp. (Plate xi., figs. 17, 18.)

This small *Syllis,* of which I have only obtained a single specimen, differs from all the other members of the group, with the exception of *S. vivipara,* in being viviparous.

It is only 4-5 mm. in length, and colourless but for a mottling of bluish green in the epithelium of the middle part of the intestine. There are 32 segments. The prostomium is slightly broader than long, and bears four very small eyes in addition to a minute frontal pair. The palpi are about equal in length to the prostomium; they are sub-conical, divergent from near the base, where they are in contact for a short distance. The median prostomial tentacle is about six times the length of the prostomium, and has about 35 segments; the lateral about four times. The dorsal peristomial tentacle is much longer than the ventral, nearly as long as the median prostomial. All the tentacles, with the dorsal cirri, are very distinctly segmented. The parapodia are not deeply divided. Each bears about 10 compound setae with bidentate falces. In a few of the last segments there is a single simple seta on the dorsal side of each parapodium. There is a single aciculum which is slightly enlarged and slightly obliqae at the end.

The dorsal cirri are alternately longer and shorter, the longer containing about 35 segments, and their length much exceeding the breadth of the body. The ventral cirri are slender, and scarcely extend as far as the extremity of the parapodia. The anal cirri resemble the longer dorsal.

The pharynx extends to the 5th segment, the proventriculus to the 9th.

There are two advanced embryos, one in the 14th and the other in the 15th segment. In the 12th and 13th segments there is a single ovum on either side.

Hitherto, as already stated, *Syllis vivipara* Krohn has been the only viviparous Syllid known.* From that species the present form differs in the bidentate character of the compound setae, as well as in the presence of frontal eyes and the greater length of the dorsal cirri.

Though it seems probable that *S. parturiens* is hermaphrodite, and that testes are present in most of the segments, the specimen does not afford conclusive evidence of this.

SYLLIS (TYPOSYLLIS) AUGENERI, n.sp. (Plate xi., figs. 19 to 22.)

Syllis (*Typosyllis*) *kinbergiana* Haswell, Augener, (1), p. 197, Text-fig. 22, Taf. iii., fig. 38.

Syllis (*Typosyllis*) *Kinbergiana* Haswell, Fauvel, (13), p. 194.

The species of *Syllis* which Augener described under the name of *S. kinbergiana* Haswell, while expressing some doubts as to the correctness of the determination, is not very rare in Port Jackson, and, as it appears to be unnamed, I have given it the above name. Augener's wrong determination is doubtless partly due to my having given insufficient data; but there are at least two points given in my original account which are entirely incompatible with Augener's conclusion—viz the very indistinctly articulated cirri and the transverse intrasegmental lines. Augener's description is very adequate, and I will merely add the following brief notes:—

There are frequently no markings, but sometimes there is a pair of grey transverse lines on the dorsal surface of each segment in the anterior region. Frontal eyes are present in most if not all cases, but they are sometimes represented by minute dots which may not be symmetrically placed.

The ordinary compound setae resemble those of *S. variegata* in shape, but the fringe of processes along the cutting edge of the falx is less developed. These are the only compound setae in the posterior region. But in the anterior and middle regions the two most dorsally placed in each parapodium (Plate xi., fig. 20) have the appendage relatively long and narrow—longer and narrower than is represented in Augener's fig. 22a. The obscurely bidentate simple setae of the posterior region which are similar to those of *S. variegata*, may extend forwards as far as about the 20th segment from the anterior end. The acicula (figs. 21 and 22) are one to four; when there are two, the more anterior (fig. 21) is very slightly bent forward at the end, with an oblique terminal (posterior) face which is slightly concave: the more posterior (fig. 22) nearly symmetrically pointed. When only one aciculum is present it is of the former type; when there are three or four, two or three are of the latter.

SYLLIS (TYPOSYLLIS) KINBERGIANA Haswell. (Plate xi., figs. 23-27; Plate xii., figs. 1 and 2).

Syllis kinbergiana, Haswell, (25), p. 7, Pl. 51, figs. 1-3.

Non Syllis (*Typosyllis*) *kinbergiana* Hasw., Augener, (1), p. 167, Taf. iii., fig. 38, Text-fig. 22 *a-c*.

Nec Syllis (*Typosyllis*) *kinbergiana*, Fauvel, (13), p. 194.

* *See* Goodrich (14), and Potts (47).

In the living condition the colouring of this species renders it readily capable of recognition. In preserved specimens in which the colour is lost, the most striking features are:—(1) the presence in the anterior region of the body of an impressed line or narrow groove running transversely across the dorsal surface of each segment; (2) the deeply bi-lobed character of the parapodia; (3) the imperfect segmentation of the dorsal cirri.

In the living condition the body is greenish-yellow or light yellow with greenish transverse lines. On the dorsal surface just behind the head is a patch of white, and on each segment is a pair of very light yellowish- or greenish-white dots. The head and the palpi are red, the eyes crimson.

The length of the largest specimens is 6 cm., the breadth in the uncontracted state only 2-3 mm. In all the anterior part of the body, as far back as the beginning of the intestine, are the transverse grooves above referred to, appearing in contracted specimens as notches in the lateral edges of the segments (Plate xii., fig. 1).

Sensory cilia are present on the tentacles and cirri and the ends of the palpi. Vibratile cilia occur on the palpi and on the sides of the segments. The whole integument is full of small oval glands.

The peristomium is bilobed, the lobes rounded on the dorsal aspect. The eyes are rather small, the posterior much the smaller. The palpi are twice the length of the prostomium when fully extended; they are fused together at the base for a short distance. The prostomial tentacles are usually sub-equal, a little longer than the palpi, segmented, but not very distinctly.

The parapodia (Plate xii., fig. 2) are very deeply divided into anterior and posterior lobes. There are about 20 compound setae (Plate xi., figs. 23 to 26), all with long and rather narrow falces which are bidentate and have extremely minute teeth along the cutting edge. On the posterior segments there is a very fine, truncate, simple seta on each parapodium dorsal to the compound setae. There are two, sometimes three, acicula of which one, the most anterior (fig. 27), is sharply bent forwards at the end and the others are obliquely truncate or obliquely pointed. No capillary setae have been seen. The dorsal cirri are rather short, very imperfectly segmented.

The pharynx runs through only three to six segments, the proventriculus usually only through three or four.

Syllis (Typosyllis) coruscans Haswell. (Plate xi., figs. 28-31).

Syllis corruscans, Haswell, (25), p. 734, Pl. l., fig. 1-3, and lv., fig. 5.

? *Syllis corruscans* Hasw., Augener, (1), p. 208.

This is the largest of the Australian Syllids, attaining a length of as much as 14 cm. with a maximum breadth of about 5 mm. There are 150 to 200 segments. The colour of the dorsal surface is usually dark green, sometimes dark brown; that of the ventral surface and of the parapodia and cirri light red or orange. The prostomium is bright crimson. On the dorsal surface of the peristomium appears a bright green spot or band.

The integumentary glands are so arranged and developed as to give a corrugated appearance to the darkly-pigmented dorsal surface, the corrugations being sometimes arranged in transverse rows, two or three on each segment with narrow furrows between.

The breadth of the prostomium is nearly twice the length. It becomes partly withdrawn under the prostomium when the animal is touched or irritated. The

palpi are broad at the base, fused with one another for a short distance, longer than the prostomium, usually directed downwards, hollowed out below and internally. The eyes are rather small, those of the anterior pair larger and wider apart than those of the posterior. The three prostomial tentacles are subequal, a little longer than the palpi, indistinctly segmented or entirely unsegmented. The peristomial tentacles which are also indistinctly ringed, are subequal, the dorsal a little longer than the ventral, shorter than the prostomial.

The parapodia are relatively short. Each bears 15 to 20 compound setae. These (Plate xi., figs. 29-31) are all of the same essential character, with bidentate falces, but the most dorsally situated (fig. 29) have the falces long and slender, a gradual transition taking place towards the most ventral setae which have the falces short and comparatively broad. In a few of the most posterior segments there are also simple setae—one dorsal to the compound setae of each parapodium, slender and hair-like, the other ventral, very short, terminating like the compound setae but without the articulation. There are 5 to 7 or more pointed acicula in each parapodium, one sharply bent forwards at the end. The dorsal cirri are alternately longer and shorter, about equal in length to the breadth of the body, not very distinctly segmented, smooth and unsegmented at the base, indistinctly segmented towards the apex.

In the original description I stated that in this species male stolons are given off from a female stock. In my more recent notes I can find no confirmation of this. Female stolons are very rare, but they occur. In the case of the female, as in that of the male, stolon, sexual elements similar to those in the stolon occur also, as in other species of *Syllis*, in the posterior region of the stock. It may be that in certain circumstances, or at certain seasons, the formation of a female stolon may so rapidly follow that of a male that the posterior region of the stock contains well formed ova before the male zooid becomes detached. But I have been unable to find any such case among recently examined specimens, which all show evidence of normal schizogamy without hermaphroditism.*

S. coruscans is far from being a typical *Syllis*. Structurally, in fact, it is closely connected with various species of *Eusyllis*, and it might quite well be described as a *Eusyllis* which reproduces with schizogamy. Apart from the superficial features of connection between the palpi at their bases and imperfect segmentation of the tentacles and dorsal cirri, *S. coruscans* is *Eusyllis*-like in having the rim of the cuticle of the pharynx occasionally divided in an irregular way into a number of lobes, which can hardly be termed teeth.† Moreover the arrangement of the radial muscles of the wall of the proventriculus corresponds completely with that which characterises *Eusyllis*, and differs from that which occurs generally, if not universally, in typical species of *Syllis*.

Sub-genus Haplosyllis Langerhans.

Syllis (Haplosyllis) spongicola Grube.

Syllis spongicola, Grube, (18), p. 104, Pl. 4, fig. 4.
Syllis djiboutiensis, Gravier, (16), p. 147, Pl. 9, fig. 3, 1900.
Syllis djiboutiensis, Augener, (1), p. 213.
(For additional synonymy *see* McIntosh, (39), p. 197.)

* See F. A. Potts (47).

† De Saint-Joseph (48) states:—"Chez beaucoup de *Eusyllis*, et cela indifféremment dans chaque espèce, le bord de la trompe, au lieu d'être dentelé n'est que déchiqueté et s'éloigne peu du bord uni et quelquefois aussi un peu déchiqueté de la trompe des *Pionosyllis*."

I have only obtained in Port Jackson two or three small specimens of this very widely-distributed species.

Sub-genus EHLERSIA Langerhans.

SYLLIS (EHLERSIA) FERRUGINEA Langerhans. (Plate xii., figs. 3-10.)

Ehlersia ferruginea, Langerhans, (35), p. 104, fig. 10.

Syllis (Ehlersia) ferruginea, Augener, (1), p. 211, Text-fig. 26.

The two specimens from Port Jackson which I refer to this species were not seen alive; in the preserved condition they have a dull yellowish-grey colour. Their length is about 8 mm., and each contains some ninety to a hundred very short segments the length being less than a tenth of the breadth.

The prostomium (Plate xii., fig. 3) bears six pairs of eyes—the frontal mere dots of pigment, the others also very small. The palpi are sub-triangular when viewed from above; behind they bulge out beyond the lateral edge of the prostomium. The median tentacle is over four times the length of the prostomium and is made up of about forty-five articuli; the lateral are three-fourths of the length of the median. Of the peristomial, the dorsal, as usual the longer, is a little longer than the lateral prostomial. The parapodia are not deeply divided. In the anterior region there are in each parapodium dorsally three or four compound setae (fig. 4) of the *Ehlersia* type with long and slender falces, feebly bidentate: ventrally the rest of the compound setae (figs. 5-7), about ten in number, have relatively short bidentate falces with the secondary tooth more strongly developed than the terminal. Posteriorly the setae of the latter type become gradually replaced by setae (fig. 7) with very short, strongly curved falces with the secondary tooth much larger than the terminal. In the posterior segments there is a simple seta with a rounded extremity dorsal to the compound setae in each parapodium. In the last two or three segments there is also a ventral simple seta (fig. 8) in each parapodium, similar to the adjoining compound setae, but without the joint. There are usually two acicula (figs. 9 and 10), slightly knobbed and bent forwards at the end, in each parapodium.

The anterior dorsal cirri are distinctly segmented, but in both specimens segmentation completely disappears before the middle of the body is reached. The first is longer than the rest, rather longer than the breadth of the body. The ventral cirri are cylindrical and not as long as the parapodia.

The pharynx extends to the 10th segment; its tooth is anteriorly situated. The proventriculus extends to the eighteenth segment; it contains about 30 annular bands.

Genus TRYPANOSYLLIS Claparede.

TRYPANOSYLLIS ZEBRA Grube.

Syllis zebra, Grube, (19), p. 86, Taf. iii., fig. 7.

Trypanosyllis krohnii, Claparede, (5), p. 98.

T. krohnii, De St.-Joseph, (48), p. 56 (180).

T. zebra, McIntosh, (39), p. 169, Pl. l., figs. 9 and 10; Pl. li., fig. 1; Pl. lxx., fig. 8; Pl. lxxix., fig. 18.

? Eurymedusa pieta, Kinberg, (31), *non* Ehlers, (10).

Syllis taeniaeformis, Haswell, (25), p. 9, Pl. l., figs. 4 and 5.

Trypanosyllis Richardi, Gravier, (16), p. 168, Pl. ix., figs. 12, 13.

Trypanosyllis taeniaeformis, Augener, (1), p. 230.

Whether Kinberg's *Eurymedusa picta* is the same as *Trypanosyllis zebra* must remain somewhat uncertain until the type specimen has been re-examined. The original diagnosis of the former is not very adequate; nor are the figures of it in the "Engenies Resa" of much value in distinguishing the species. But the name, and the locality afford some indication "Port Jackson, Novae Hollandiae, summa aqua." On the other hand, the New Zealand and South Australian species which Ehlers put down as *Eurymedusa picta* Kinberg, after examining Kinberg's original specimen, is quite distinct, and has been determined by Benham as a species of *Odontosyllis* (see *Odontosyllis suteri* Benham).

T. zebra is not at all rare a little below low-water in Port Jackson, frequenting especially the roots of the Laminarian *Eklonia radiata*. It is one of the larger Syllids, attaining a length of as much as 6 or 7 cm. Both male and female stolons are white with two pairs of red eyes.

The mode of stolonisation in the Port Jackson form is that described by Marion and Bobretsky (45), and De St.-Joseph (48) as characterising *T. zebra* [See Potts (47), p. 13]. When the stolon is ready for separation the stock bears ventrally a small prolongation terminating in a pair of anal cirri.

Family EUSYLLIDAE.

Genus Syllides Oersted.

Syllides longicirrata Oersted.

Syllides longicirrata, Oersted, (46), p. 11, Tab. ii., fig. 2 *a-b*.
Syllides longicirrata, Malmgren, (41), p. 39.
Syllides longocirrata, Langerhans, (36), p. 548.
Anoplosyllis fulva, Marion et Bobretzky, (45), p. 28, Pl. ii. and iii., fig. 8.
? Syllis ochracea, Marenzeller, (42), p. 27, Taf. iii., fig. 1.
Syllides longocirrata, De Saint-Joseph, (48), p. 165 (41).
Syllides longocirrata, Augener, (1), p. 229.

The three specimens of *Syllides* which I have obtained in Port Jackson agree very closely with Marion and Bobretzky's description and figure of *Anoplosyllis fulva* except in one point, which may be of some importance. My specimens have well-developed lenses in the frontal eyes—a condition rarely met with. The posterior eyes have no lenses. I have not been able to see the *ventral* simple setae referred to by Langerhans. The *dorsal* simple setae, which are gently curved and blunt, occur singly on all the parapodia except the first three.

The yellow corpuscles which are distributed over the whole dorsal surface of the peristomium correspond very closely with the constituent elements of the "yellow bodies" of the *Exogoneae*. In a female specimen ovaries occur from the ninth setigerous segment backwards.

Genus Eurysyllis Ehlers.

Eurysyllis tuberculata Ehlers.

Eurysyllis tuberculata, Ehlers, (6), p. 264, Taf. 11, figs. 4-7.
Polymastus paradoxus, Claparede, (5), p. 109, Pl. viii., fig. 3.

I have seen only two specimens of this remarkable form, obtained at Point Piper, Port Jackson, among Algae.

Genus PIONOSYLLIS Malmgren.

PIONOSYLLIS MELAENONEPHRA, n.sp. (Plate xii., figs. 11-16; Plate xiii., fig. 1.)

Complete, sexually mature specimens reach a length of about 1.4 cm. with a breadth of about 1 mm., and contain 65 to 75 segments. But many specimens show evidence of having lost a part of the fragile posterior region, which has become imperfectly regenerated. Thus a number of specimens contain only about 25 to 50 segments of normal character, with or without a narrow posterior continuation of 3 to 12 small segments, obviously formed by a process of regeneration.

The general ground-colour in the living animal is yellowish, or greenish, or light pink. On the prostomium, just behind the eyes, is a transverse black line concave forwards; this sends forwards a median longitudinal band which bifurcates in front between the eyes. Usually the dorsal surface of the palpi is dark with a narrow oblique light line. Each of the first few segments has a simple transverse black band across its dorsal surface. On a few segments (usually the fifth to the eighth, sometimes a larger number) there is a second transverse black band. Further back again each segment has a single band, broad in the middle, narrowing laterally. These bands become shorter posteriorly and disappear altogether towards the middle of the body—the posterior part being either devoid of markings or with lighter grey transverse lines. Some black pigment also occurs on the ventral surface of a few of the most anterior segments of the body Similar pigment is also present in the pharynx, in the proventriculus and in the walls of the nephridia.

Vibratile cilia are present on the palpi, on the lateral borders of the segments and in groups on the parapodia. Non-motile (sensory) cilia are abundant on the tentacles and cirri.

The prostomium (Plate xiii., fig. 1) is broader than long. The peristomium is visible dorsally for a short distance only. The eyes vary greatly in development, but are usually large and may touch or overlap: small frontal eyes are present. The palpi are large, entirely separate, divergent from close to the base, with an almost oblong outline: but frequently their shape is disguised by various degrees of flexion. In the active living animal they are usually extended almost vertically downwards and folded inwards at the ends, so as frequently to touch one another ventrally in front of the mouth. The prostomial and peristomial tentacles are segmented, but the segmentation is less distinct towards the base. The median prostomial tentacle is longer than the lateral, longer than the prostomium and palpi together. The dorsal peristomial tentacle, longer than the ventral, is about equal in length to the median prostomial.

The long, narrow, pointed parapodia are about equal in length to half the breadth of the segments. At about the 23rd segment, a distinct notopodial rudiment with a small aciculum makes its appearance, and persists throughout the rest of the segments. Each neuropodium has one, two, or sometimes three, acicula and about fifteen to twenty long and slender compound setae. The acicula (Plate xii., fig. 16) have a conical extremity surrounded at the base by a ring-like thickening. In the compound setae of the anterior region (Plate xii., fig. 11), the falces, very long and narrow in the case of the most dorsal, decrease in length ventrally, becoming quite short, but are all of the same essential character: bidentate with the two terminal teeth nearly equal, the cutting edge convex, finely ciliated. Posteriorly (Plate xii., figs. 12-15) a change takes place: the

falces become shorter, and the secondary tooth comes to preponderate over the terminal. In the parapodia of the most posterior region there are two sets of simple setae, one of the first set on the dorsal side of each bundle of compound setae, and one of the second set on the ventral side. The dorsal simple setae are slender hairs like the capillary swimming setae; the ventral resemble the shortest and most ventral of the compound setae except in the absence of the articulation. In sexually mature specimens the segments containing the ripe genital products, and usually a few in front of them, have notopodial bundles of capillary setae; but these are very short, much shorter than the compound setae.

The dorsal cirri are alternately longer and shorter; the longer are in general about as long as the breadth of the body or a little longer; all are very slender and indistinctly segmented. The ventral cirri are short, rarely extending as far as the ends of the parapodia, and usually falling far short of it. In shape they are elongated compressed cones, the terminal portion comparatively slender. These ventral cirri are mobile to a quite unusual degree, the slender tip moving about freely. The anal cirri are entirely unsegmented.

When the proboscis is retracted, the ring of pharyngeal papillae lies in the fifth segment. In the eighth segment lies the single dorsal tooth, which is thus well behind its usual position, though it is still in front of the middle of the pharynx. The pharynx extends back as far as the thirteenth segment; the proventriculus lies in the fourteenth to the twentieth. The latter has about twenty-five rows of muscle-columns.

There is no trace of schizogamy. Mature males have the segments full of sperms from about the twentieth segment backwards, except in a limited region at the posterior end. The females, when mature, have numerous small ova in each of the segments from about the twenty-third to about the fifty-fifth. Gestation apparently does not occur.

The nephridia are very conspicuous in most specimens owing to their walls containing much black pigment.

In spite of the fact that the union between the palpi is absent, and in spite of the presence of the limited degree of segmentation in the tentacles and dorsal cirri, this species seems to find its nearest allies in the members of the genus *Pionosyllis*. The position of the tooth, though it is not further back than in certain species of *Syllis*, such as *S. prolifera*, seems to separate it from the other described species of *Pionosyllis*. Apparently it comes nearest to *P. weissmanni* Langerhans [(36), p. 246, fig. 11] and *P. weissmannoides* of Augener [(1), p. 223, text-fig. 30].

P. melaenonephra is not rare among the roots of oar-weeds (*Eklonia radiata*) in Port Jackson. It is very alert and active and very fragile, so that complete specimens are not easily obtained.

PIONOSYLLIS DIVARICATA Keferstein. (Plate xiii., figs. 2 and 3).

Syllis divaricata, Keferstein, (30), p. 111.

Syllis normannica, Claparede, (4), p. 40, Taf. xiii., fig. 24.

Pionosyllis divaricata, Langerhans, (36), p. 545.

Pionosyllis ? divaricata, McIntosh, (38), p. 164, Pl. lix., fig. 12; Pl. lx., fig. 7; Pl. lxxix., fig. 17.

The only specimen of this species which I have obtained is about 8 mm. in length in the preserved condition and less than 1 mm. in greatest breadth. It was almost colourless in front when alive, but for black pigment in the proto-

plasmic cores of the radial muscle-fibres of the proventriculus; but throughout the greater part of its length it was strongly coloured with dark brown, almost black, pigment, not collected into transverse lines, but distributed over the dorsal surface and the parapodia, with a tendency to the formation, in places, of irregular longitudinal lines. There are 43 segments, but some have been lost. Towards the middle, where the body is broadest, the length of the segments is about one-fourth of the breadth.

The prostomium is a little broader than long, and bears four rather large eyes, the two of each side in close contact. The tentacles and dorsal cirri are entirely devoid of segmentation. The median tentacle is about three to four times the length of the prostomium, the lateral scarcely twice that length. The palpi diverge widely from one another, and their basal junction is of very slight extent. The dorsal peristomial tentacle is longer than the median prostomial, about five times the length of the prostomium.

The dorsal cirri are longer than the breadth of the segments in front; shorter behind. The parapodia are simple and undivided, much shorter than the breadth of the segments.

The setae (Plate xiii., figs. 2 and 3) usually about 12 in each parapodium, are very long and slender, and are all of one type, though decreasing as usual in the length of the falx from the dorsal towards the ventral side. The falx terminates in two teeth situated close together, the secondary tooth rather more pronounced than the terminal, and strongly hooked. No simple setae are present, but this may be due to the loss of the posterior segments. The acicula, two or three in number, are simple and straight and sharp-pointed or blunt. The ventral cirri are shorter than the parapodia, long, conical, but with a suddenly narrowing terminal part.

The pharynx extends to the tenth segment: its median tooth, which is blunt, lies just behind its anterior margin in the 5th segment. The proventriculus extends to the 15th segment, and has about 30 rows of muscle-columns.

Though there are one or two points (such as the absence of frontal eyes) in which the single specimen does not agree with the description of the European species, the correspondence on the whole is very close.

Genus Odontosyllis Claparede.

Odontosyllis detecta Augener.

Odontosyllis detecta Augener (1), p. 236, Taf. iii., fig. 33 and text-fig. 34.

I have obtained five specimens which seem to be referable to this species—three mature males and two mature females. Since Augener had only a single incomplete specimen before him, I am able to supplement his account with sundry additional particulars.

The largest specimens are about 6 mm. in length and contain 35 to 40 segments. There is no definite colouration apart from the colours of the internal organs. Vibratile cilia are widely distributed on the surface—on the palpi, on the prostomium, on the peristomium, on the borders of the segments, and on the parapodia. Non-motile (sensory) cilia are also abundant, and are specially elongated on the inner borders of the palpi.

In the males the enormous eyes occupy a large part of the dorsal portion of the prostomium, and posteriorly those of opposite sides are only separated by a very narrow interval; in one specimen they bulge out beyond the normal limits

of the prostomium. In the specimen last referred to there is no clear indication that there are two eyes on each side, and only one lens is distinguishable; but in the remaining males the anterior and posterior eyes, though intimately united, are to be distinguished by their separate lenses and by slight fissures. In the female, on the other hand, the eyes are quite small and separate; in front of each anterior eye is a small frontal eye which appears to have a small lens.

The palpi are quite conspicuous both in the living and fixed specimens. Their basal parts are fused to form a transverse bridge in front of the mouth. From this bridge, the anterior edge of which is slightly in front of the anterior border of the prostomium, separated from one another by a wide interval, arise the free portions of the palpi as ovate processes projecting forwards in front of the prostomium, or doubled back on the ventral side. There is no trace of a nuchal prominence.

The tentacles and cirri present no trace of definite segmentation, though irregularly annulated. The median tentacle is about twice the length of the prostomium, the lateral a little shorter than the median. Of the peristomial tentacles the dorsal is, as usual, the longer, and is, approximately, of the same length as the lateral prostomial. Of the dorsal cirri the first is much longer than the others, and is about the length of the median tentacle or a little longer. The rest are alternately longer and shorter: on the average their length is about equal to half the breadth of the body.

The parapodia are bilobed, the posterior (dorsal) lobe being the larger. There are ten or twelve compound setae in each parapodium. These, which are figured by Augener (Text-fig. 34), have short, unidentate falces. On the dorsal side of the compound setae in each parapodium there is, in all but the first 8 to 16 segments, a very fine capillary simple seta; no ventral simple setae were found.

Capillary swimming setae are present in one of the male specimens from the 14th segment backwards, absent in the others. There is a single aciculum with a slightly knobbed extremity which is distinctly bent backwards. The ventral cirri are broad, ovate, shorter than the parapodia.

The pharynx extends as far back as the 6th segment; the proventriculus to the 10th. The pharyngeal teeth are somewhat difficult of analysis. But there seem to be six teeth and two jaw-pieces, two of the teeth being closely connected with the latter, and the remaining four free between them. This is very near what is described and figured by Marenzeller [(42). Taf. iv., fig. 2D] for *Odontosyllis virescens* (*O. ctenostoma*).

In the females, ovaries occur from the 6th or 7th segments backwards. In the male, testes begin about the 6th segment. A limited region, comprising the 11th to the 14th segments, is in all three specimens specially developed, with large testes in the 13th and 14th, and the body-cavities distended with ripe spermatozoa which are absent in the rest of the body.

The specimens were found among Algae at Watson's Bay, Port Jackson.

Augener, on the strength of the enlarged eyes, compares his *O. detecta* with *O. hyalina* Grube; but there seems to be sufficient evidence to prove that the feature in question is a sexual and not a specific character. Apart from this, the affinities of *O. detecta* are much more with *O. ctenostoma*, with which Augener makes no comparison. In fact, the only differences to be detected are the absence of the nuchal lobe, and also of the dorsal, simple, hooked setae, which, according to Langerhans [(36), p. 556, fig. 15*a*, *b*.] and St.-Joseph [(47), p. 53, 177], occur on the more posterior parapodia in the latter species.

ODONTOSYLLIS FULGURANS Aud. et Edw.

Odontosyllis fulgurans, Audouin et Edwards, Ann. Sci. nat., t. xxix., p. 229

Odontosyllis fulgurans, McIntosh, (39), p. 178, Pl. xlix., fig. 5; Pl. lix., figs. 15 and 15 *a* and *b*; Pl. lxx., fig. 11; Pl. lxxx., fig. 4.

For further synonymy *see* McIntosh.

I have obtained only two specimens of an *Odontosyllis* which, if not identical with the European and North American species above named, is very nearly related to it. *O. fulgurans* seems to be characterised by the great length of the proventriculus, running through ten or eleven segments, the hooked falces of the compound setae with a minute tooth near the middle of the cutting edge, and the absence of nuchal or occipital lobe.

In the living condition the Port Jackson specimens were of a brownish colour with irregular whitish flecks; the eyes were red. The only complete specimen is about 7 mm. long, with about 50 segments. In one the pigment of the two eyes on either side is to some extent coalescent; in the other the two are close together but clearly separated; in the former a pair of frontal eyes are represented by a pair of ventrally placed minute specks of pigment.

The teeth in the retracted condition of the proboscis lie in the fourth segment. As far as can be made out they are six in number. A striking feature is the presence in the wall of the pharynx, just behind the teeth and immediately in front of the anterior end of the proventriculus, of an opaque ring which appears quite black in the cleared specimen. A similar appearance on a smaller scale is observable at the posterior end of the proventriculus. These two dark bodies are evidently the proventricular glands, anterior and posterior, which I described in the *Exogoneae*. They, or at least the anterior, occur in all *Syllidea* so far as I have observed; but they are usually very inconspicuous and only recognisable in sections* or, in the case of some of the *Exogoneae*, in favourably stained entire specimens.

ODONTOSYLLIS SUTERI Benham.

Odontosyllis suteri, Benham, (2), p. 161, figs. 1 and 2.

Eurymedusa picta, Ehlers, (10), p. 21.

Non *Eurymedusa picta*, Kinberg, (31).

Odontosyllis suteri has been found by Benham at various points on the coast of the South Island of New Zealand, and also occurs at the Kermadec Islands. I have only hitherto found two specimens in Port Jackson. Ehlers's confusion of this species with *Eurymedusa picta* of Kinberg is referred to under *Trypanosyllis zebra*.

O. suteri is characterised (1) by the presence of a wellmarked nuchal lobe, (2) by the falx of the compound setae terminating in a single tooth, but having a "secondary tooth" about the middle of the concave edge, and (3) by the very long proventriculus running through 15 segments. As in *O. fulgurans* the proventricular glands are very conspicuous in the cleared specimen.

I am indebted to Professor Benham for New Zealand specimens.

ODONTOSYLLIS FREYCINETENSIS Augener.

Odontosyllis freycinetensis, Augener, (1), p. 234, Pl. ii., fig. 7; text-fig. 33.

I have obtained only one specimen of an *Odontosyllis* which is certainly identical with Augener's *O. freycinetensis* from Western Australia. It is 4 mm.

*A trace of the anterior glands is distinguishable in Augener's figure of *O. glandulosa* (Taf. iii., fig. 37).

long, and comprises only 24 segments, but is obviously incomplete. It is of a general grey colour, darker in the region behind the proventriculus than in front. The colouration proves under the microscope to be due to the presence of irregular patches of black pigment partly arranged in broken transverse lines. This occurs not, as is usually the case, in the dorsal integument, but deep within the muscular layers—presumably in the peritoneum.

The pharynx and proventriculus are displaced owing to rupture; the teeth and jaw-pieces, so far as they can be seen, closely resemble those of *O. detecta*. The acicula do not end in a simple point, but are sharply bent forwards at the extremity.

Genus AMBLYOSYLLIS Grube.

AMBLYOSYLLIS SPECTABILIS Johnston. (Plate xiii., figs. 4-10).

Pterosyllis (*Gattiola*) *spectabilis*, Johnston. (29), p. 195, Pl. xvi*a*, figs. 1-7.
Pterosyllis formosa, Claparede, (4), p. 46, Pl. xiii., figs. 30-34.
Pterosyllis plectorhyncha, Marenzeller (42), p. 47, Pl. 5, fig. 3.
Amblyosyllis Madeirensis, Langerhans, (36), p. 561, Pl. 32, fig. 19.
Pterosyllis (*Gattiola*) *spectabilis*, St.-Joseph, (48), p. 63, Pl. 9, figs. 64-67.

This small Syllid occurs sparingly among the roots of *Eklonia* a few feet below low-water mark in Port Jackson.

The length is about 1 cm. and the number of segments 14 to 30. Some specimens are colourless or nearly so, or have only the dorsal cirri pigmented; others, in addition to the pigment in the cirri, have an elaborate pattern formed of dark pigment on the dorsal surface of the segments; others have a system of transverse violet lines. In some female specimens, two longitudinal violet lines run throughout the intestinal region. In some the only internal colouration is due to the orange intestinal epithelium. The tentacles and cirri, including the ventral, are full of mulberry-shaped glands which discharge fine thread-like bodies. All the tentacles and the dorsal cirri are alike in not being distinctly segmented at their bases. The prostomium, (Plate xiii., fig. 4) rounded in outline, bears two pairs of eyes of variable size dorsally and a third, very minute, pair in front of them, but on the ventral surface, and therefore directed downwards. The median tentacle is about ten times the length of the prostomium, the lateral about four or five times. The palpi (Pl. xiii., fig. 5) are very short, scarcely visible from above, united together for a short distance in front of the mouth to form a sort of upper lip with a median suture; laterally each extends outwards so as to project slightly beyond the lateral border of the prostomium.

The peristomium, small and closely united to the prostomium, bears dorsally and laterally, widely separated from one another, a pair of ciliated lobes which represent the "ailerons occipitaux" or nuchal wings of other species. These may be short and globular, or may be elongated so as to extend back over the first setigerous segment. The dorsal peristomial tentacle is longer than the ventral, about the length of the lateral prostomial.

The parapodia (fig. 6) have a very distinct anterior lobe or lingula. Each bears some 5 to 12 stout, bidentate, compound setae (figs. 7 and 8) with very fine and short cilia on the cutting edge. The acicula, usually five or six in each parapodium, are straight and pointed. The dorsal cirri are much longer than the breadth of the body in the living and active condition; they are not definitely segmented towards the base. The broad ventral cirri are longer than the parapodia. The penultimate segment has two pairs of jointed cirri, the dorsal the

longer, considerably longer than the breadth of the segment, the ventral composed of only two or three joints. The anal cirri are similar to the dorsal.

The oral end of the pharynx is provided with a circlet of six well-separated teeth (figs. 9 and 10), each of which is divided into five sharp cusps, the central one larger than the others.

The Port Jackson *Amblyosyllis* is very nearly related to that found at Dinard by St.-Joseph and regarded by him as being identical with *Gattiola spectabilis* of Johnston (29), *Pterosyllis plectorhyncha* of Marenzeller (42), and *P. madeirensis* of Langerhans (36). The apparent greater lateral extension of the palpi in the Australian form, together with the variability in the length of the nuchal wings and the presence of the ventral eye-spots, are probably not of crucial importance, while the correspondence of the setae and acicula and the peculiar glands in the tentacles and cirri, with the threads which they discharge, correspond closely with St.-Joseph's descriptions. The only discrepancy that appears to be of importance is with regard to the teeth. Marenzeller's figure [(42), Taf. v., fig. 3D] of the teeth of his *Pterosyllis plectorhyncha* is much nearer what is to be seen in the Port Jackson specimens than St. Joseph's description and figures [(48), p. 65, Pl. 9, fig. 66]. In spite of these apparent differences it appears probable that the European and Australian forms will prove to be identical.

Augener (1) found only fragments of an *Amblyosyllis* in the Hamburg Expedition's collection. These he considered to agree well with Ehlers's *A. granosa* from Magellan (7).

Family AUTOLYTIDAE.

Genus AUTOLYTUS.

AUTOLYTUS PACHYCERUS Aug.

Autolytus pachycerus, Augener, (1), p. 257, fig. 11 and 12; Text-fig. 40.

The Port Jackson species of *Autolytus* which I refer to the above species is characterised by its extremely brilliant colouration, but alcohol-preserved specimens after a time completely lose all trace of this, and Augener's statement "Die Farbung ist eintönig gelblich weiss ohne besondere zeichnung" becomes applicable to them.

The most striking superficial feature of thee living worm is the presence in the middle of the dorsal surface of each segment of a bright blue or purple spot, usually rounded, but sometimes produced into a transverse streak. This occurs both in the stock and in the stolons at all stages. The ground colour is red or orange.

The stock is about 5 mm. in length and contains about 50 segments. The proventriculus lies in the 7th and 8th, or 8th and 9th segments; in one specimen it was more elongated, extending from the 8th to the 12th. The first stolon is produced by schizogamy. Later a chain results from gemmation. The separated off female stolons containing each about 30 segments at first swim about actively and are provided with capillary swimming setae on all the segments except the first seven or eight. Afterwards the capillary setae become lost, and a little before or shortly after this takes place the ova are discharged, to be subsequently carried about enclosed in a capsule on the ventral surface of the parent.

A male stolon has about the same number of segments as the female and has capillary setae on all the segments except the first three.

In all stages the first pair of dorsal cirri are much longer than any of the rest except the second which approaches it in length.

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EXPLANATION OF PLATES.

Plate x.

Fig. 1. *Syllis variegata.* One of the compound setae. (x 1500).
Fig. 2. *Syllis variegata.* Acicula. (x 440).
Fig. 3. *Syllis pectinans*, n. sp. Dorsal view of head and anterior region of body. (x 80).
Fig. 4. *S. pectinans.* Outline of parapodium in the anterior region seen from the dorsal side, with the acicula.
Fig. 5. *S. pectinans.* One of the compound setae. (x 1040).
Fig. 6. *S. pectinans.* Dorsal simple seta. (x 1040).
Fig. 7. *S. truncata*, n. sp. Dorsal view of anterior region. (x 100).
Figs. 8-9. *S. truncata.* Compound setae. (x 1040 and 1400).
Fig. 10. *S. truncata.* Dorsal simple seta. (x 1400).
Figs. 11-14. *S. truncata.* Acicula. (x 1400).
Fig. 15. *S. gracilis.* Acicula. (x 1040).

Plate xi.

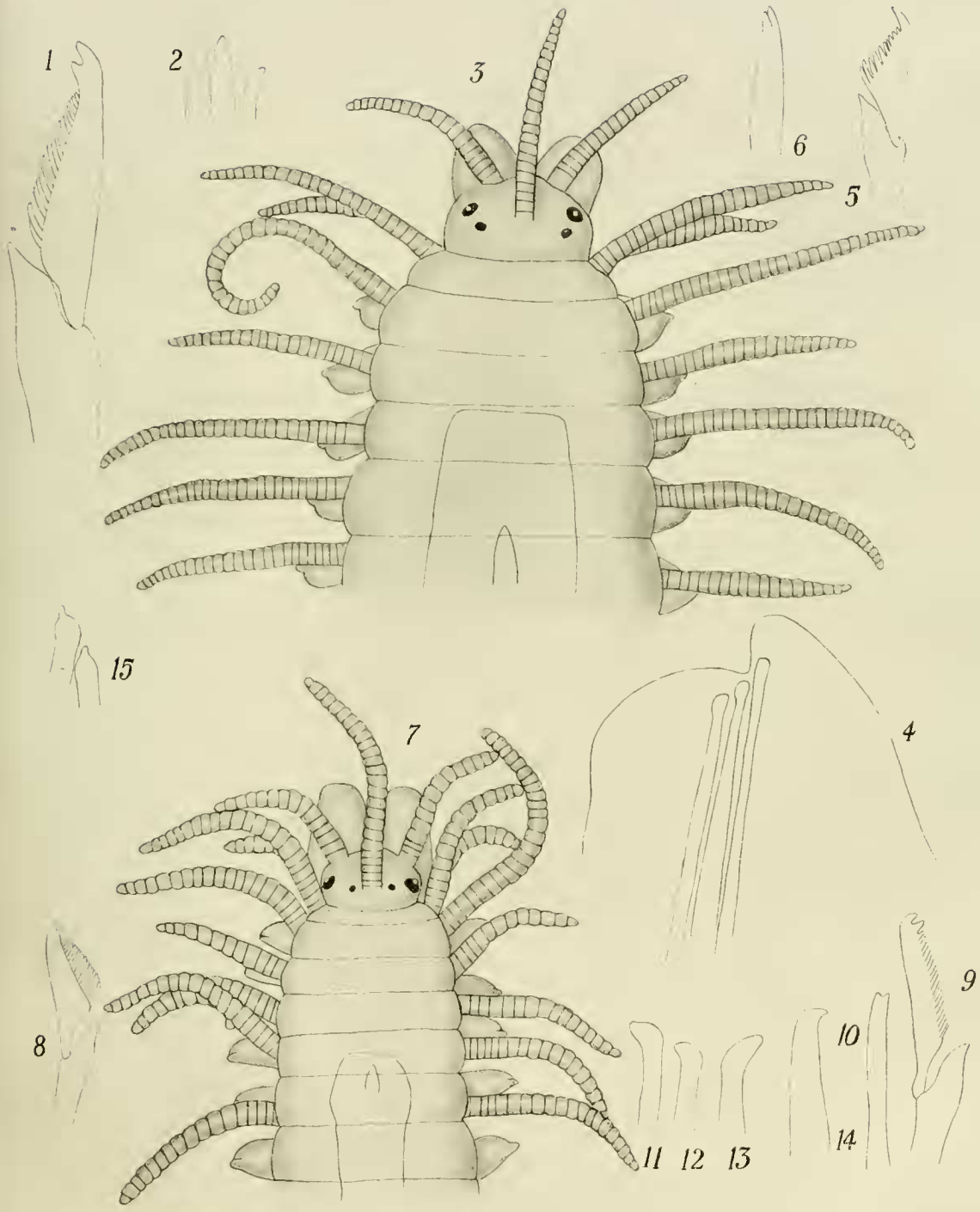
Fig. 1. *Syllis punctulata*, n. sp. Dorsal view of anterior region, magnified.
Fig. 2. *S. punctulata.* Outline of parapodium from above.
Fig. 3. *S. punctulata.* Compound seta of the anterior region. (x 1040).
Fig. 4. *S. punctulata.* Compound seta of the posterior region. (x 1040).
Figs. 5-10. *S. punctulata.* Dorsal simple setae. (x 1040).
Fig. 11. *S. punctulata.* Ventral simple seta. (x 1040).
Figs. 12-16. *S. punctulata.* Acicula (x 1040).
Fig. 17. *S. parturiens*, n. sp. Anterior region. (x 140).
Fig. 18. *S. parturiens.* Most dorsal compound seta.
Fig. 19. *S. augeneri*, n. sp. Dorsal view of parapodium (x 440).
Fig. 20. *S. augeneri.* Most dorsal compound seta. (x 1400).
Figs. 21-22. *S. augeneri.* Acicula. (x 1400).
Figs. 23-26. *S. kinbergiana* Haswell. Compound seta (x 1040).
Fig. 27. *S. kinbergiana.* Acicula. (x 1000).
Fig. 28. *S. coruscans* Haswell. Head, magnified.
Figs. 29-31. *S. coruscans.* Compound setae. (x 600).

Plate xii.

Fig. 1. *Syllis kinbergiana.* Anterior region, dorsal view.
Fig. 2. *S. kinbergiana.* Outline of parapodium as seen from above. (x 240).
Fig. 3. *S. ferruginea* Langerhans. Dorsal view of anterior extremity, magnified.
Fig. 4. *S. ferruginea.* One of the most dorsal of the compound setae. (x 1040).
Figs. 5-7. *S. ferruginea.* More ventrally situated compound setae. (x 1040).
Fig. 8. *S. ferruginea.* Ventral simple seta. (x 1040).
Figs. 9-10. *S. ferruginea.* Acicula. (x 1040).
Fig. 11. *Pionosyllis melaenonephra*, n. sp. One of the most dorsal compound setae of the anterior segments. (x 1040).
Fig. 12. *P. melaenonephra.* One of the most dorsal setae of the posterior segments. (x 1040).
Figs. 13-14. *P. melaenonephra.* Compound setae of posterior segments. (x 1040).
Fig. 15. *P. melaenonephra.* Ventral simple seta of posterior segments. (x 1040).
Fig. 16. *P. melaenonephra.* Aciculum.

Plate xiii.

Fig. 1. *Pionosyllis melaenonephra.* Anterior region, magnified.
Fig. 2. *P. divaricata* Keferstein. Most dorsal of the compound setae. (x 1040).
Fig. 3. *P. divaricata.* More ventral compound seta. (x 1040).
Fig. 4. *Amblyosyllis spectabilis* Johnston. Anterior region, dorsal view.
Fig. 5. *A. spectabilis.* Ventral aspect of head in outline to show the palpi and the ventral eyes.
Fig. 6. *A. spectabilis.* Outline of parapodium from above. (x 240).
Fig. 7. *A. spectabilis* Most dorsal compound seta. (x 1040).
Fig. 8. *A. spectabilis* More ventrally situated compound seta. (x 1040).
Fig. 9. *A. spectabilis.* Circlet of six composite teeth round the rim of the pharynx.
Fig. 10. *A. spectabilis.* One of the teeth. (x 1040).



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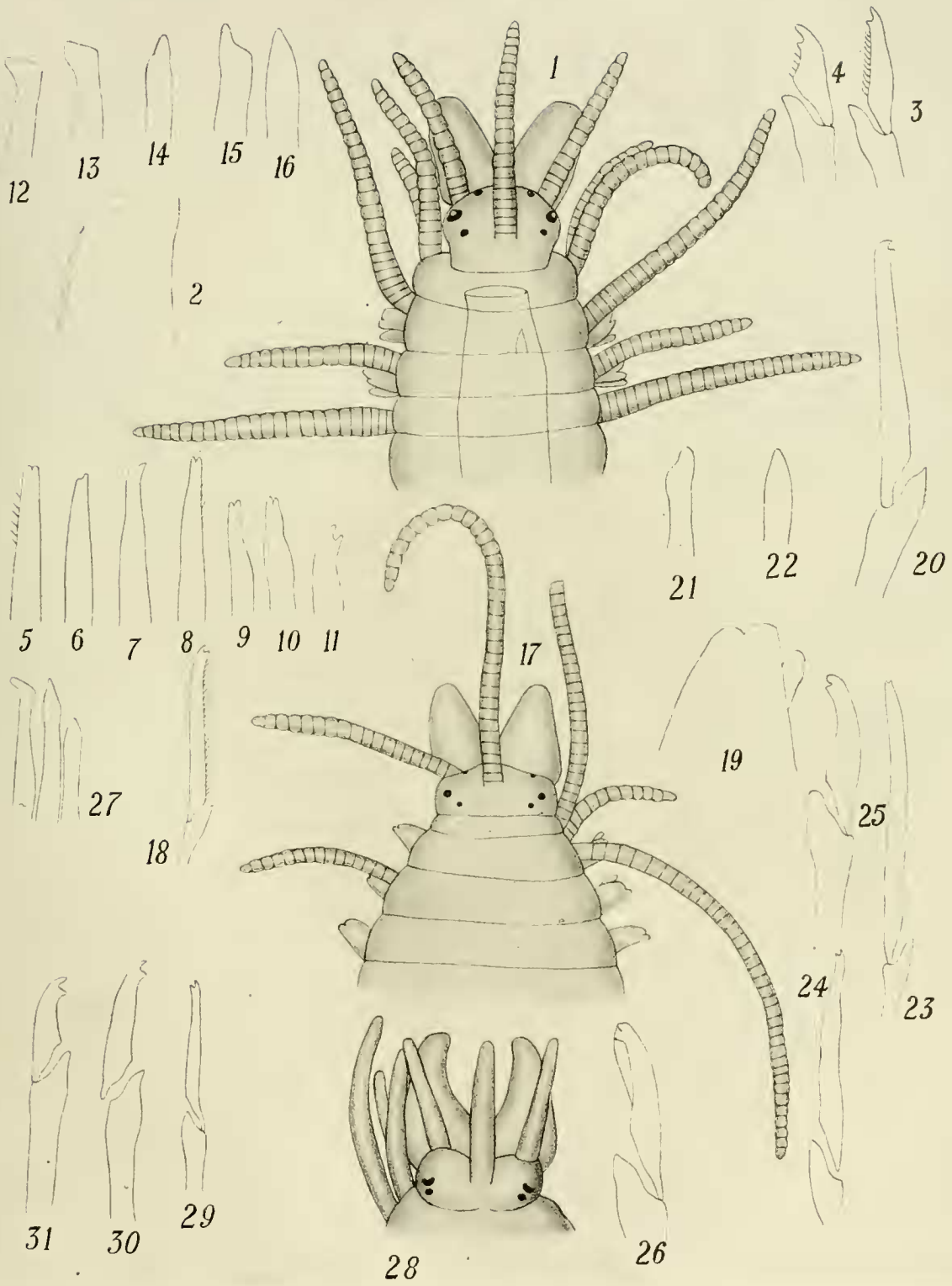
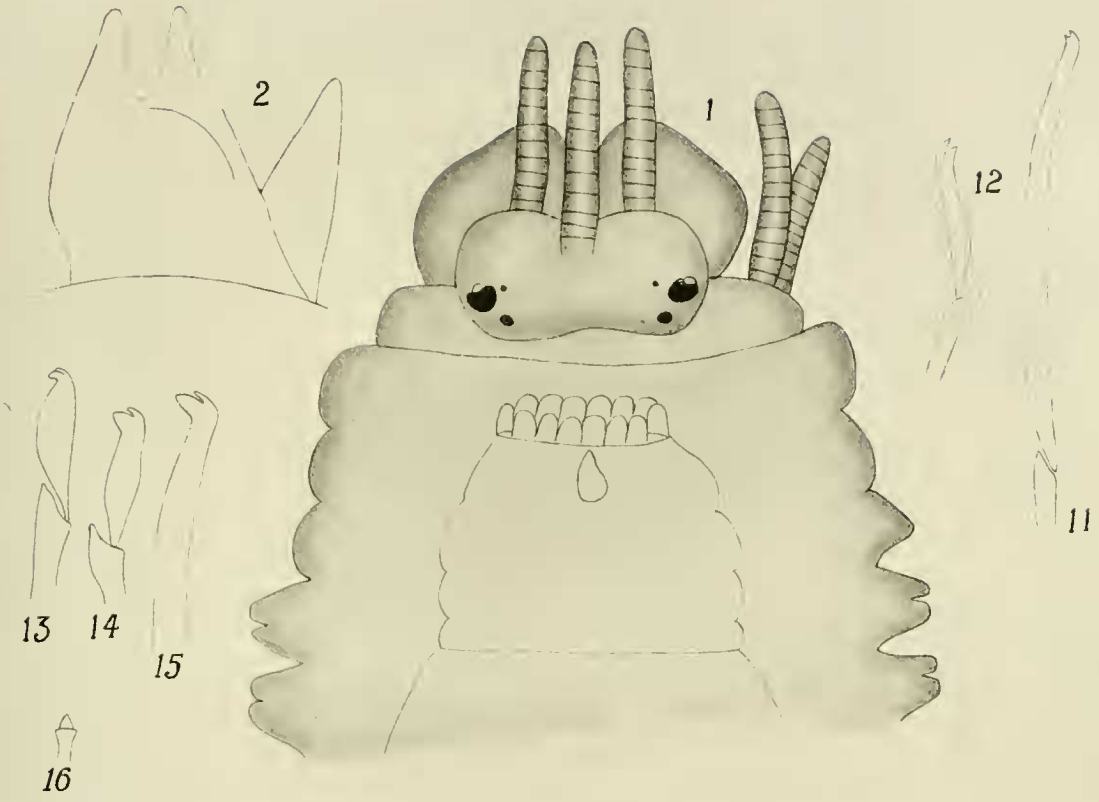
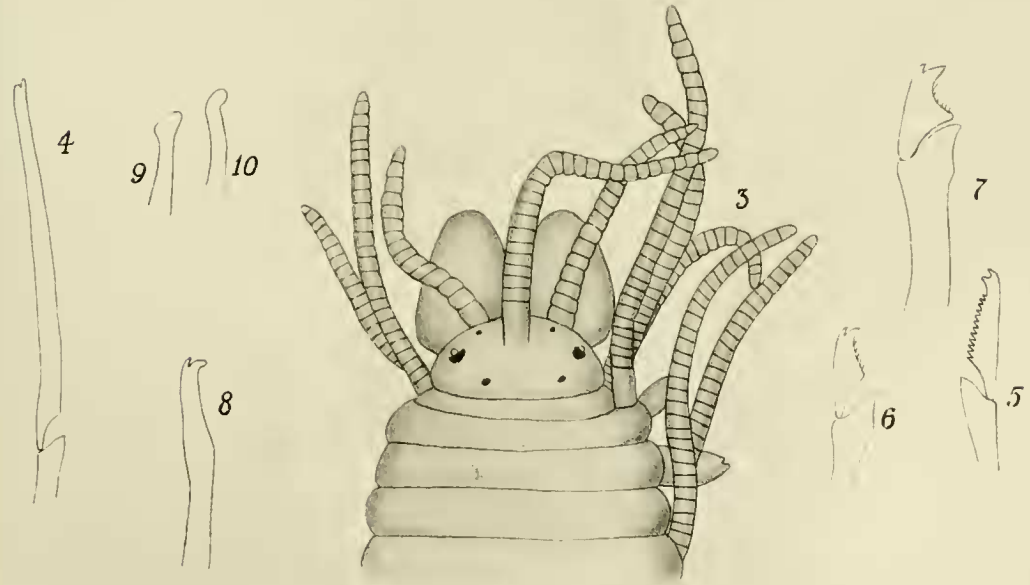
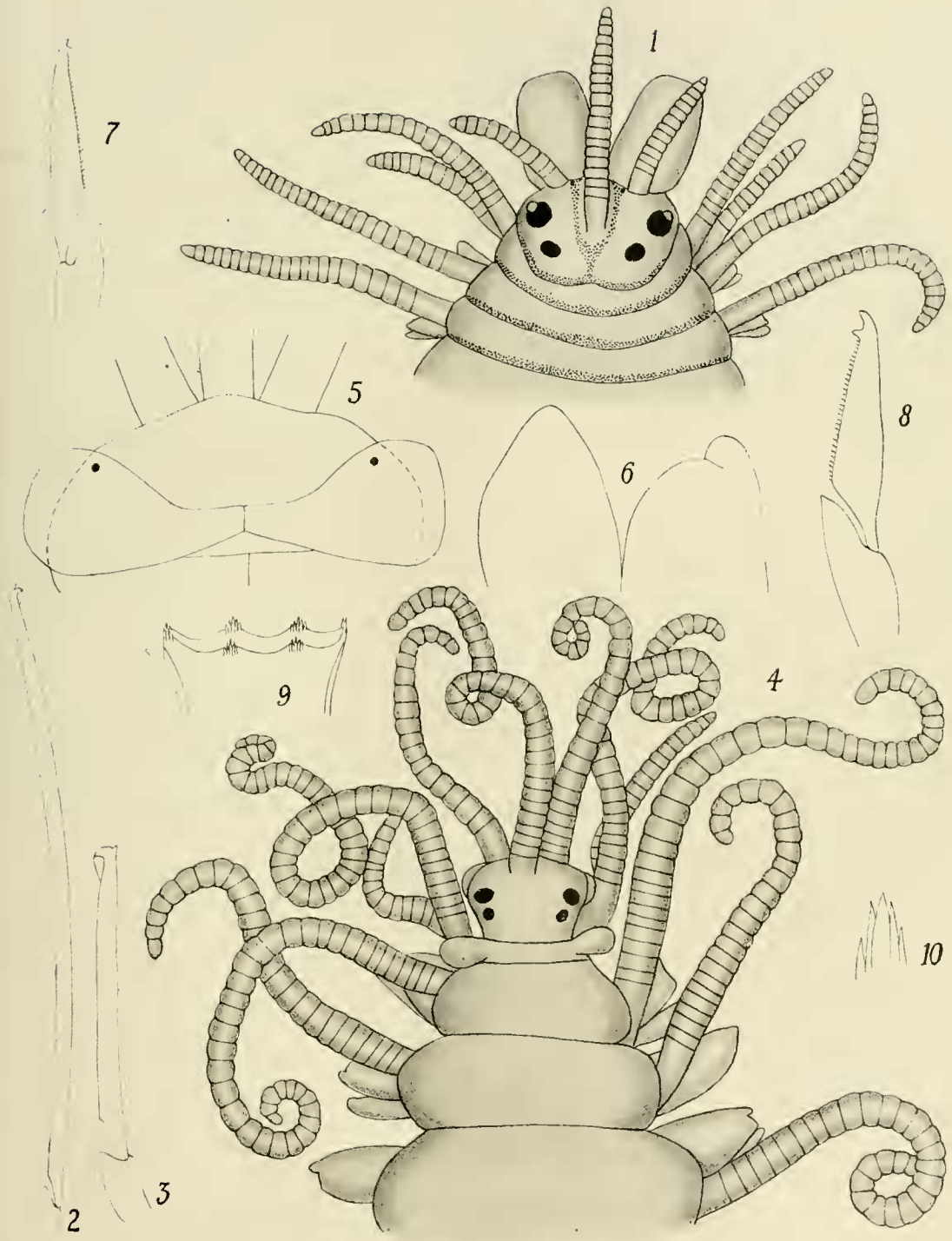


1-16. *Syllis punctulata*. 17-18. *S. parturiens*. 19-22. *S. augeneri*. 23-27. *S. kinbergiana*. 28-31. *S. coruscans*.





1-2. *S. kinbergiana.* 3-10. *S. ferruginea.* 11-16. *Pionosyllis melacronephra.*



1. *Pionosyllis melaenonephra*. 2-3. *P. divaricata*. 4-10. *Amblyosyllis spectabilis*.